

IT24101605
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PS Lab Sheet 09





Exercise

1. Assume that the time taken to bake a batch of cookies is normally distributed with mean 45 minutes and standard deviation 2 minutes.

i. Generate a random sample of size 25 for the baking time.

ii. Test whether the average baking time is less than 46 minutes at a 5% level of significance.

```
1 getwd()
2
3 ## Set directory
4 setwd("C:\\Users\\03cri\\Desktop\\IT24101605")
5 getwd()
6
7
8 ## Exercise: Cookie baking time
9 ## Parameters
10 mean_time <- 45
11 sd_time <- 2
12 sample_size <- 25
13
14
15 ## i. Generate random sample
16 set.seed(123)
17 sample_data <- rnorm(sample_size, mean = mean_time, sd = sd_time)
18 print(sample_data)
19
20
21 ## ii. One-tailed t-test: H0: mean = 46, H1: mean < 46
22 t_test <- t.test(sample_data, mu = 46, alternative = "less")
23 print(t_test)
24
25
```

Environment	History	Connections	Tutorial
  Import Dataset	 46 MiB		
R	Global Environment		
Data			
t_test	List of 10		
Values			
mean_time	45		
sample_data	num [1:25] 43.9 44.5 48.1 45.1 45.3 ...		
sample_size	25		
sd_time	2		

```

[1] "C:/Users/03cri/Desktop/IT24101605"
>
> ## Set directory
> setwd("C:\\Users\\03cri\\Desktop\\IT24101605")
> getwd()
[1] "C:/Users/03cri/Desktop/IT24101605"
>
>
> ## Exercise: Cookie baking time
> ## Parameters
> mean_time <- 45
> sd_time <- 2
> sample_size <- 25
>
>
> ## i. Generate random sample
> set.seed(123)
> sample_data <- rnorm(sample_size, mean = mean_time, sd = sd_time)
> print(sample_data)
[1] 43.87905 44.53965 48.11742 45.14102 45.25858 48.43013 45.92183 42.46988 43.62629
[10] 44.10868 47.44816 45.71963 45.80154 45.22137 43.88832 48.57383 45.99570 41.06677
[19] 46.40271 44.05442 42.86435 44.56405 42.94799 43.54222 43.74992
>
>
> ## ii. One-tailed t-test: H0: mean = 46, H1: mean < 46
> t_test <- t.test(sample_data, mu = 46, alternative = "less")
> print(t_test)

```

One Sample t-test

```

data: sample_data
t = -2.8167, df = 24, p-value = 0.004776
alternative hypothesis: true mean is less than 46
95 percent confidence interval:
 -Inf 45.58124
sample estimates:
mean of x
44.93334

```